Teaching Statement

Fu Lin*

1 Teaching is challenging

During my Ph.D. study, I had the opportunity of teaching undergraduate and graduate students in a number of engineering classes. What I learned from my experience is that teaching is a challenging task. The main challenge comes from three aspects.

First, teaching requires solid understanding. It is said that you will never learn a topic better than when you start to teach it. My experience confirms this saying. In fact, I believe that being able to explain clearly is a useful test for my understanding of the subject. Second, teaching requires skills. To understand well is not a sufficient condition for being an effective teacher. It takes a great deal of practice to be able to explain in an easy-to-follow manner. Third, and perhaps most important, teaching requires commitment. Showing a high level of commitment to teaching motivates students to work hard. On the other hand, commitment to teaching demands effort. Before I was a teaching assistant, I did not fully appreciate the amount of time it takes to prepare class material such as lecture notes and homework solutions.

2 Teaching is rewarding

Having acknowledged these challenges, I also must say that teaching is rewarding.

Teaching improves my understanding. As I prepare the material, I try to anticipate areas needing more clarification. This experience helps me realize teaching is by no means a mechanical task. It is a creative process that can be improved over time. Questions raised by students who are new to the subject can often provide a different perspective. These questions make me think more deeply about basic concepts and provide new interpretations.

Teaching improves my presentation skills. To engage students with diverse backgrounds, I need to draw from everyday life experience and provide concrete examples. To deliver the messages effectively to students, I must get to the point quickly and emphasize its importance. These presentation skills are also essential for me to present my research ideas to a general audience with little technical background.

Teaching advances my research agenda. Teaching a research-oriented class is one of the most rewarding experiences a scientific researcher can ask for. I was fortunate to get involved in preparing lecture notes for the distributed control course taught by my Ph.D. advisor Prof. Mihailo Jovanović at the University of Minnesota. Not only did I see how my research was taught in classroom, but I also interacted with other graduate students whose valuable feedback further advanced my research directions.

*Fu Lin is with the Mathematics and Computer Science Division, Argonne National Laboratory, Lemont, IL 60439. E-mail:fulin@mcs.anl.gov.

3 My approach to teaching

My approach comprises three aspects. Prepare well. As an early career teacher, I will have to prepare, prepare, and prepare well. Students can easily tell whether the teacher is well prepared or not for the class. From my own experience as a student, I have observed poorly prepared lectures, and I could sense the frustration of other students in those situations. These experiences have made me determined to prepare well for lectures that I will be teaching.

Know students. Without understanding what challenges students are facing in class, the teacher can not help them overcome these difficulties. I usually come to lectures a few minutes early and stay after the class to interact with students. By listening to their questions and comments, I get a good idea about how I did and what could be improved next time.

Encourage questions. Questions are useful feedback from students. It is relatively easy to teach a small group of students interactively because one gets immediate feedback. It is harder to receive feedback during lectures in a large class. In this setting, I would encourage questions by pausing in lectures, asking questions to assess students' understanding, and adjusting pace accordingly. If students answer my questions correctly, I will give verbal praise.

4 My teaching experience

I have been involved in teaching several undergraduate and graduate classes as a teaching assistant and as a student lecturer. Detailed information about these classes can be found in my curriculum vitae. Furthermore, I have been mentoring a number of undergraduate students in their senior design projects and several master and Ph.D. students in their research projects. Based on my experience, I believe that I am qualified to teach the following courses.

- Convex optimization: an introductory optimization course with emphasis on recognizing and formulating convex problems that arise in engineering applications.
- Linear and nonlinear optimization: an advanced course on optimization with emphasis on numerical tools for solving linear and nonlinear optimization problems.
- Distributed control: a research-oriented course based on my research with advanced tools from diverse fields including control theory, optimization, graph theory, and network science.
- Linear systems and optimal control: a basic graduate control course on properties and modeling of linear systems and on the design of linear quadratic regulators.
- Signals and systems: a fundamental course in engineering on basic techniques for analysis and design of signal processing, communications, and control systems.

I will develop new courses based on my research that are supplemental to the existing curricula of the department.